IMAGE COMPRESSION SYMPOSIUM II

JPEG2000 Part 9 – JPIP Interactive Imagery Protocol

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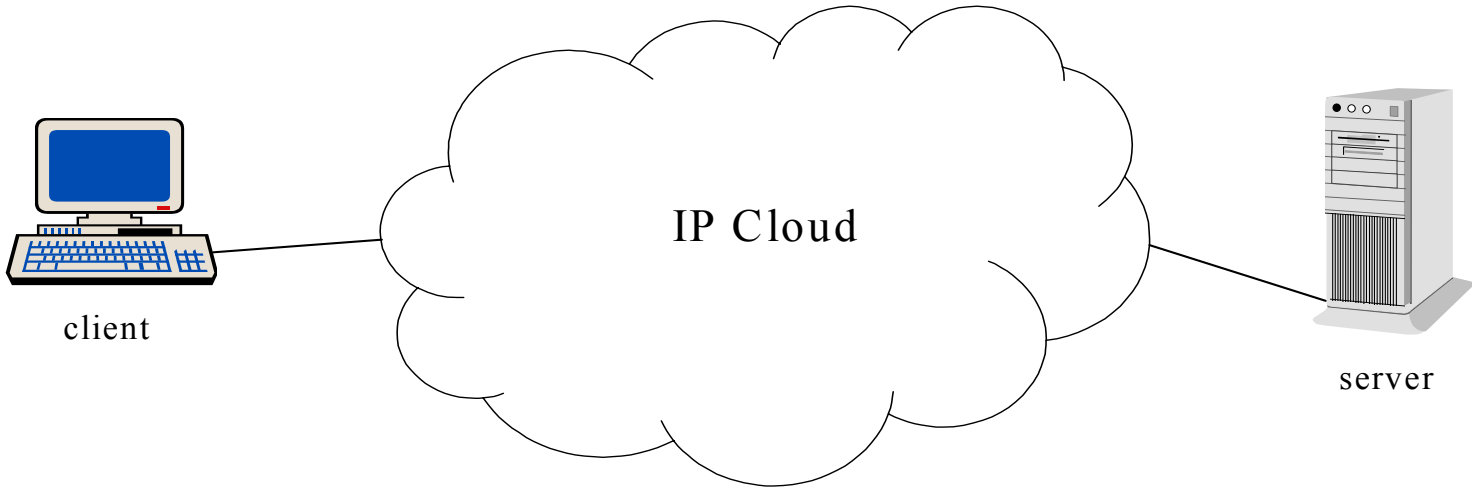
JPIP Simple Functional Goal



- Client makes “simple” requests to view a part of an image
  - Zoom, Pan, Get metadata
- Server makes a sensible response
  - Optimise for data transmission efficiency – i.e. relevant data to request
  - Plus extra important data the client should know (e.g. metadata titles)

Use Cases

- Embedded web application
- Smart dissemination services
- PC-based browsing of digital image libraries
- Security Video Tracking with ROI Hierarchy
- Query XML metadata
- Collaborative Image Browsing

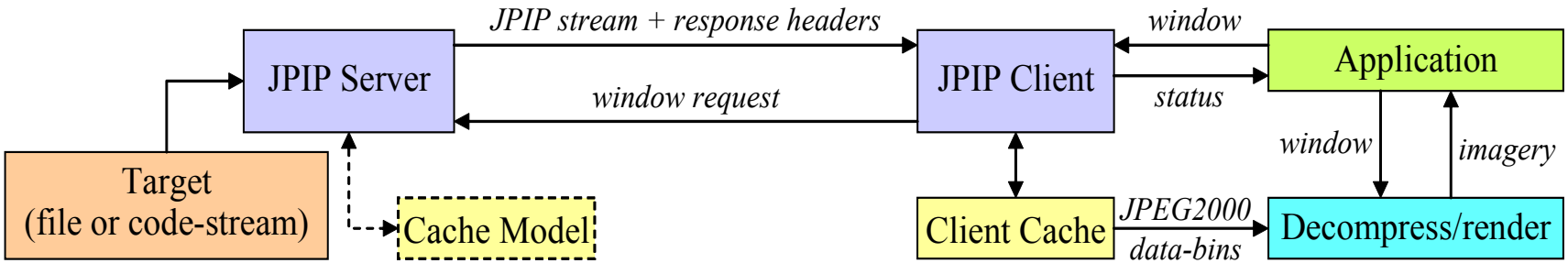
JPIP Fundamental Concepts

- Self-describing response data-stream sent by server
  - Equivalent as an “extension” to the code-stream structure
  - Allow arbitrary ordering of compressed data elements
  - Can build up information across multiple sessions, etc.
  - Mime types:
    - Precinct based - image/jpp-stream
    - Tile based - image/jpt-stream
  - Can be stored and read as a file in its own right
- Client requests
  - Simple description by image parameters (e.g. size, offset)
  - Explicit description of JPEG2000 elements (headers, packets)

JPIP Fundamental Concepts

- Efficient transmission of data
  - Efficient server should optimise transmission – i.e. only send data needed by the client to satisfy request
    - Server can send more data based on what it thinks the client might need (e.g. titles of embedded metadata)
    - Server may send more data to optimise it's own performance
    - Concept is that server behaves in a way that provides responsiveness while respecting the goal of efficient transmission
  - Data can be cached on the client
    - Server models the cache – Server minimises re-transmission of redundant data

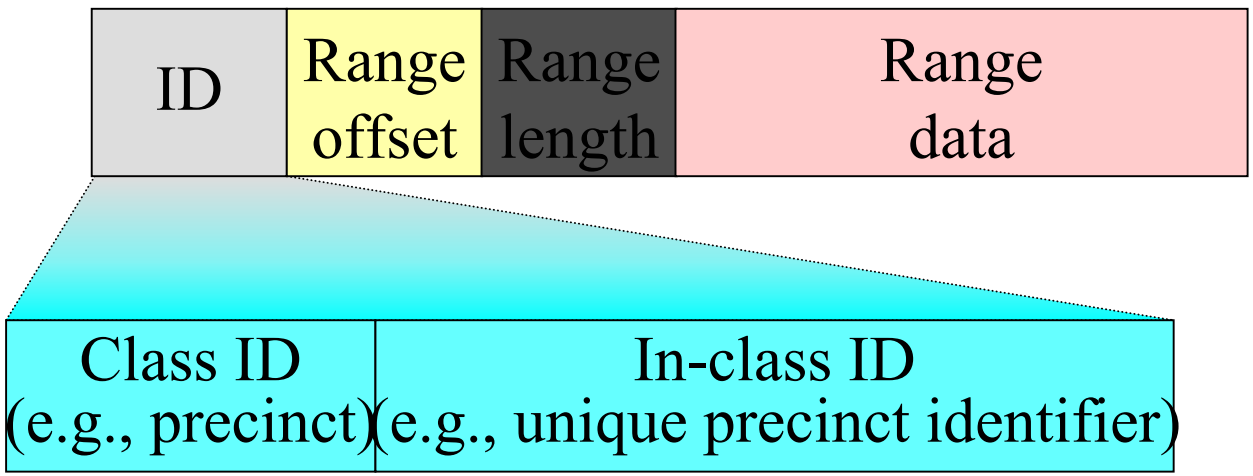
JPIP Fundamental Concepts



- Data-Bins
  - All code-stream data is arranged into data-bins with unique ID
    - Imagery data (headers, precinct packets)
    - Metadata boxes
    - All tables of offsets
- File equivalents
  - Servers can condense complex structures (such as Motion JPEG2000 files MJ2, Compound JPEG2000 Documents JPM) into more simple equivalent files (either static or dynamically created) to reduce complexity of client requests

JPIP Fundamental Concepts

- Transports
  - Can be used on any transport
  - Implementations available in HTTP, TCP, UDP
- Response message structure



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JPIP Program

- Committee Draft - March 2003
- Final Committee Draft – July 2003
- Draft International Standard – December 2003
- Final Draft International Standard – March 2004

Military applications

- Bandwidth challenged networks
  - Access virtual infinite size image over < 8kpbs links
- QOS challenged networks
  - Robust to high Bit Error Rates – Implement graded error protection
  - Robust to high latency – Uses asynchronous signalling
- Optimise imagery dissemination – Reduce network congestion
  - Efficient dissemination of imagery
  - Very efficient for interactive sessions with large imagery
- Cascading servers provides robust distributed imagery services
  - Minimise transmission of redundant or superfluous data on networks

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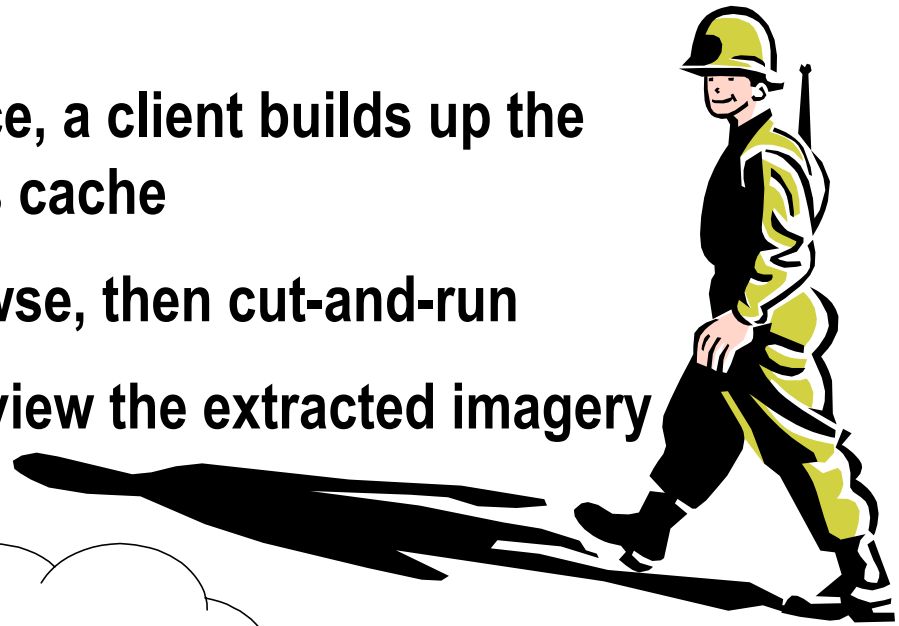
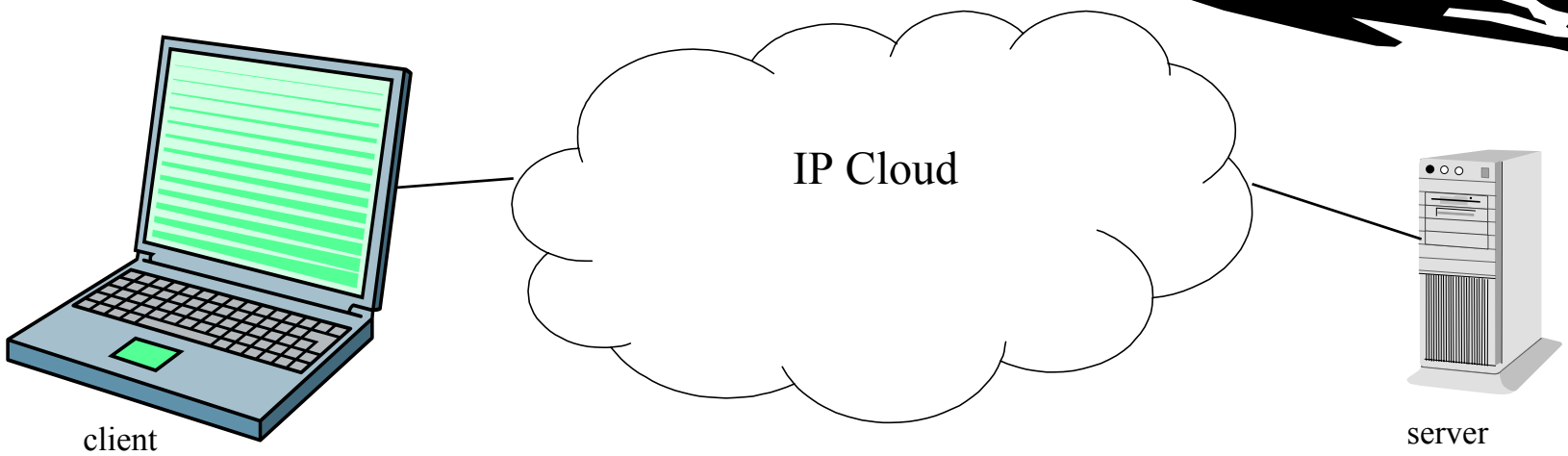
Military applications

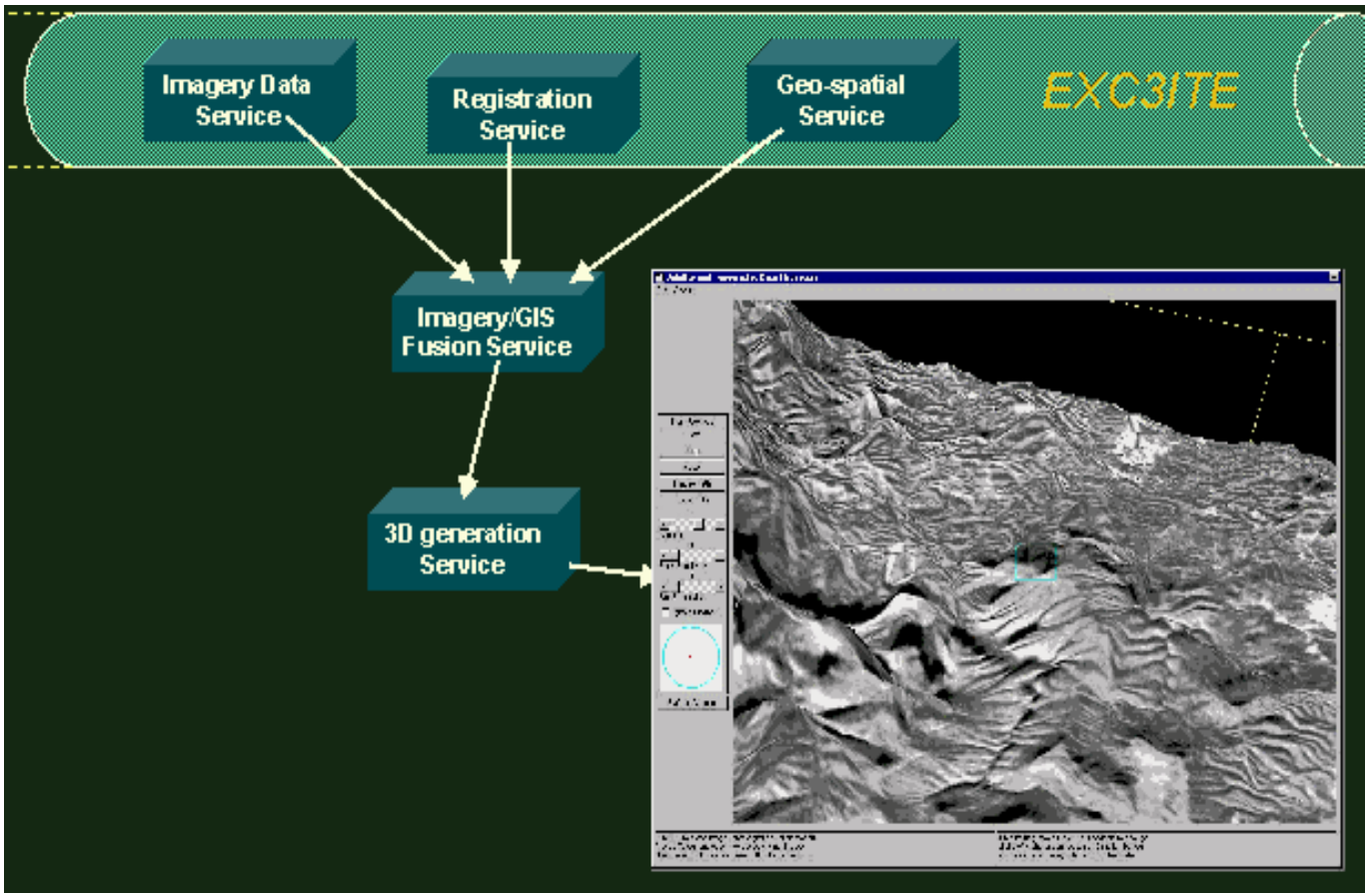
- Browse, Cut and Run
  - By querying an imagery service, a client builds up the self-describing JPIP data in its cache
  - Thus a laptop user would browse, then cut-and-run
  - Uses the data in the cache to view the extracted imagery from their browser session





Imagery & Geospatial Services

– Example – 3D terrain service



JPIP for DTED

- Dissemination of Digital Terrain Elevation Data by JPIP
  - Mission planning